

REMARKS

This is in full and timely response to the above-identified Office Action. Reexamination and reconsideration in light of the proposed amendments and the following remarks are respectfully requested.

In this response, independent claims 1 and 6 are cancelled and respectively replaced with new claims 7 and 8, respectively. These claims are set forth in terms which are both clear and distinct and which are such as to render the rejections under 35 USC 112, second paragraph and 35 USC § 102(b) moot.

The newly presented independent claims 7 and 8 recite, *inter alia*, that: among the three procedures that are to be executed by the microprocessor in the programmable controller (user program process, I/O refresh process, and peripheral service process), the user program process and the I/O refresh process are executed by the normal process of the microprocessor, while the peripheral service process is executed for a prescribed amount of time according to an interruption process of the microprocessor every time an interruption trigger is generated by interruption trigger generating means.

These independent claims distinguish over the applied art. Hayashi (U.S. patent No. 5,051,945) discloses a special function unit for a programmable controller. As will be seen from the prior art in Fig. 3, this special function unit 2 exists between the programmable controller 1 and external unit 5. The object of Hayashi, as is apparent from column 1, line 65 - column 2, line 4, is to provide a special function unit that quickly responds to an instruction from the programmable controller. With this special function unit, the period of time that elapses from the time instant the programmable controller applies an instruction until the special function unit starts control is uniform. In other words, Hayashi neither discloses nor suggests ensuring cyclic execution of the peripheral service process for a prescribed amount of time, as per the claimed subject matter.

In this rejection it is asserted that Hayashi discloses an interruption trigger generating means (for example, OR circuit 7) for generating an interruption trigger at a prescribed interval; and interruption process means for interrupting the user

program process by the normal process means and executing peripheral service process by a prescribed amount according to an interruption procedure every time an interruption trigger is generated. However, the Applicant respectfully submits that this is error. The microprocessor 2a located at the output side of the OR circuit 7, as indicated in the rejection, is accommodated within the special function unit 2 as apparent from prior art in Fig. 3, and not accommodated within the programmable controller 1. Further, the flip-flop circuit 6 located on the input side of the OR circuit 7, is to latch the output signal of the PC. Therefore, an interrupt trigger will not be generated at a prescribed cycle on the output side of the OR circuit 7. The rejection is further in error in that the selection of first and second modes is not possible.

It is therefore submitted that the claimed subject matter is patentable over Hayashi for at least the reasons advanced above.

Yonezawa et al. (U.S. patent No. 5,553,297) discloses a programmable controller with a change-over system associated with 1-bit processor and an ordinary processor for executing the sequence control program. The object of Yonezawa is to provide a programmable controller capable of facilitating the alternating operation of the general purpose and dedicated processors, and speeding up the process as a whole. In addition, according to column 2, lines 40-47 of Yonezawa, this programmable controller is provided with improvements not only in the internal geometry of the CPU boards but also in efficiency of general arithmetic processing, information processing, control operation, BASIC program processing associated with communication with a host computer system, and sequence control program processing. According to Fig. 29, the I/O refresh process, user program process, and peripheral service process (service processing) are executed sequentially by the normal processing. At least, based on Fig. 29, cyclic execution of a peripheral service process by a prescribed amount under interruption process is neither disclosed nor suggested. Further, interruption request service process is disclosed in Fig. 17. However, judging from Fig. 17, this interruption request service process has no relevance to the peripheral service process. Also, an interrupt generating circuit 24 exists in Fig. 22. However, this interrupt generating circuit 24 operates in response to a power supply cut-off detecting circuit 21, high temperature abnormality detecting circuit 22, and software abnormality detecting circuit 23, and does not

generate interrupt triggers cyclically as set forth in the pending independent claims. Further, it is the abnormality generation interrupt processing that is executed in response to the interrupt generating circuit 24 as an interrupt, and not peripheral service process as per the claimed subject matter.

As explained above, Yonezawa discloses an improvement relating to a change-over system between 1-bit processor and ordinary processor, and to speed up the process as a whole through the improvements. This is distinctly different from ensuring the cyclic execution of a peripheral service process by a prescribed amount, for instance, to enable a smooth data relay function without regard to the time period required for the execution of a user program process as per the claimed subject matter.

It is submitted that the claimed subject matter is patentable over the disclosure of Yonezawa for at least the reasons advanced above.

Flood (U.S. patent No. 5,139,189) discloses a programmable controller configured to execute several priority levels of program tasks. According to column 2, lines 16-25, Flood allocates the amount of processing time devoted to the machine operation control program and the amount of time devoted to executing background tasks. However, referring to the same portion, as a method of resolving such, background tasks (arguably equivalent to the peripheral service process of the present invention) are executed in a time slice manner without adversely interfering with the execution of the control program. As it is apparent from such disclosure, Flood merely executes the peripheral service process in a time slice manner. Such a technique is equivalent to the prior art technique described in the instant specification. Therefore, Flood only discloses executing peripheral service process in a time slice manner. It does not disclose or suggest ensuring the cyclic execution of a peripheral service process by a prescribed amount every time an interruption trigger is generated while the user program process and the I/O refresh process are executed by the microprocessor according to the normal procedure.

The claimed subject matter, on the other hand, prioritizes the cyclic execution of a peripheral service process by a prescribed amount over the execution of the machine control program. It is submitted that the Flood reference contains no disclosure regarding this operation.

Shultz (U.S. patent No. 4,638,452) discloses a programmable controller including a main processor which can be interrupted by a support processor which operates as a real time clock. According to this programmable controller, the interval between interrupts is determined by instructions within the user control program. However, Shultz neither discloses nor suggests the cyclic execution of a peripheral service process.

The dependent claims are also patentable for at least the same reasons as the independent claims on which they depend. In addition, they recite additional patentable features when considered as a whole.

In conclusion, it is submitted that the claimed subject matter is patentable over the references which have been applied. Favorable reconsideration and allowance of this application is courteously solicited.

Date November 10, 2003

FOLEY & LARDNER
Customer Number: **22428**
PATENT TRADEMARK OFFICE
Telephone: (202) 672-5485
Facsimile: (202) 672-5399

Respectfully submitted,

By 

William T. Ellis
Attorney for Applicant
Registration No. 26,874

Keith J. Townsend
Registration No. 40,358